

Technology Evaluation for Environmental Risk Mitigation Principal Center

Parts Washers

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Background

Solvent based parts washers are prevalent among NASA's Centers and vary in design and hazardous constituents. Recent developments of Bio-based parts washers that are approved for use in nearly all applications with minimal waste generation should be considered to replace parts washers at all NASA Centers. While Bio-based parts washers offer a very good alternative, others should be considered for use because of the variety of needs each NASA Center may have.

Parts washers are used throughout facilities in machine shops, pre-clean room areas, garages, and other areas. They are used to clean ground service equipment, facilities maintenance equipment, as well as flight hardware.

Typically, parts washers are used to clean gross contamination and further cleaning (precision) may be required after cleaning at a parts washer.

Typical solvent based parts washers generate hundreds of gallons of waste a year per washer and are both an environmental and worker safety concern.

Recently, equipment manufacturers have developed bio-based cleaning systems utilizing aqueous degreasing fluids that eliminate most of this waste stream entirely. These parts washers typically require no draining and only require a new filter and to be topped off with replacement fluid several times a year in high-usage situations. This eliminates the large quantity of hazardous waste that some parts washers generate and eliminates VOCs that are generated in solvent based parts washers. These bio-based parts washers greatly reduce the release of VOCs and eliminate liquid hazardous waste.

There are also other types of alternative parts washers on the market and in development, including some being developed for gross degreasing at NASA Centers. Many types of parts washers should be initially considered in order to find the best fit for each NASA facility.

Several NASA Centers have already converted to alternative parts washers and have all reported satisfactory results. Some alternative cleaning solutions to be used on some very specific and exotic metals with no discoloration or damage to the substrate. If testing should be necessary to determine whether a Center's current parts washing operation can use an alternative cleaning system, the testing will likely be performed at a NASA facility that already has implemented such a parts washer.

Objective

the objective of this project is to facilitate NASA Centers' conversion to bio-based non-hazardous parts washers or other environmentally friendly alternative parts washers, wherever possible.

If demonstration or validation is necessary for certain components or alloys that are currently being cleaned with parts washers, then those demonstration / validations may be accomplished at NASA facilities that are already using environmentally friendly parts washers.

Project Scope



Parts washers are in use a nearly all NASA facilities. Their use is required for degreasing of small hand-held parts for both facilities maintenance as well as flight hardware cleaning. Typically, and in the past, parts are scrubbed or submerged in a solvent-based cleaner in such a parts washer until clean. The time it takes to clean a part is crucial, considering that sometimes many parts need to be cleaned in a work-day. In the past, aqueous parts washers were not considered practical because they could not deliver the level of cleanliness required or the time it took to clean a part was far greater than if cleaned with a solvent degreaser.

Typical parts washers use solvent blends to clean parts. The cleaner is run through a filtration system until it is too dirty to be used, and at such a time the solvent cleaner is removed and disposed of as hazardous waste (either for recycling or fuels blending typically), or recycled by the vendor for a monthly service charge.

Recently bio-based parts washers have come into the industrial market place for use in these same types of operations. The technology is based on microbes that use petroleum, amongst other things as a food source. Hydrocarbon-eating microbes are



blended with special nutrients and catalysts and then introduced into petroleum-contaminated water. The microbes are safe to humans and the environment, having no recognized hazard potential under ordinary conditions of handling.

This new technology will reduce NASA's environmental footprint across nearly all NASA Centers and will also decrease the cost of operation for many of the facilities. It is a positive step toward sustainability in the industrial workplace throughout NASA.

Technical Objectives

- Demonstrate alternative parts washers to determine if there are any incompatibilities if necessary (sensitive or exotic substrates or flight hardware may be areas of concern here)
- Determine which Centers can switch with ease (have no contracts with other parts washer manufacturers) make those a first priority.
- Determine which Centers will have to wait until their contract for parts washers is up for renewal to change to the new technology
- Implement new parts washers at all NASA facilities wherever possible. Work with the other stakeholders and technology vendors to determine if new formulations can be made to allow for its use in areas that do not qualify currently after demonstration / validation phase.

Quality Objectives

- Performance: Performance should meet current parts washer performance, taking into account a possible increase in time to wash, but a lower initial cost of equipment and an elimination of waste streams.
- Availability: Available on the market today
- Reliability: Other NASA facilities have used environmentally-preferred parts washers for all applications, including flight hardware.